REMARKS

Claims 1-18 are pending. Claims 1, 10, and 16 have been amended. No new matter has been added. Reconsideration and allowance of the above-referenced application are respectfully requested.

A drawing stands objected to for including solid black shading. The drawing has been amended to remove the solid black shading. No new matter is added by this amendment. A substitute drawing sheet showing a corrected Fig. 1 is enclosed.

The disclosure stands object to for identified informalities. The specification has been amended to correct these informalities. In addition, the specification has been amended to correct other informalities identified by the Applicant. No new matter is added by this amendment. A marked-up version of the changes to the specification incorporated in this amendment is enclosed.

Claims 17-18 stand rejected under 35 U.S.C. 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Regarding claim 17, the Official Action states that the terms "second source virtual channel" and "second destination virtual channel" are not adequately described in the specification. Applicant respectfully disagrees and directs attention to the following points in the specification where multiple source and destination virtual channels are discussed, thus effectively disclosing that there may be a "second" of such channels. The sentence beginning at line 28 of page 2 incorporates the words

"source and destination virtual channels." On page 3 in the paragraph beginning at line 16, the establishment of multiple "source virtual channels" and "destination virtual channels" is discussed. The discussion of ATM networks in the Detailed Description beginning with line 6 of page 4 and terminating at line 14 of page 5 also discusses the concept of multiple virtual channels and the multiple sources and destinations associated with such virtual channels. And, the sentence at lines 5-7 on page 12 addresses the existence of multiple source and destination virtual channels. For these reasons, Applicant respectfully suggests that the terms "second source virtual channel " and "second destination virtual channel", as presented in the original claim 17, are adequately described in the specification and suggests that the claim should be allowable.

Regarding claim 18, the Official Action states that the term "the third control cell" was not adequately defined in the specification. Applicant respectfully disagrees and directs attention to the following points in the specification where multiple control cells are discussed, thus effectively disclosing that there may be a "third" of such cells. On page 2 in lines 15-17, control cells are defined as including "forward resource management and backward resource management cells." And, in the discussion of controlling traffic on ABR connections in the Detailed Description beginning with the paragraph at line 16 on page 8 and terminating on page 12 at line 7, the existence and use of multiple forward resource management and backward resource management cells is discussed. For these reasons, Applicant respectfully suggests that the term "the third control cell", as presented in the original claim 18, is adequately described in the specification and suggests that the claim should be allowable.

Claims 10-15 stand rejected under 35 U.S.C. 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Regarding claim 10, the Official Action states that, "the statement 'the switching circuitry comprising circuitry to exchange data and control cells between the source and the destination virtual channel' is not clear.' Applicant has amended claim 10 to clarify that data cells and control cells are exchanged between the source virtual channel and the destination virtual channel. With this amendment, claims 10-15 should now be allowable.

Claims 1-16 stand rejected under 35 U.S.C. 102(e) (as it existed before amendment by the American Inventors Protection Act (AIPA) in 1999) as allegedly being anticipated by Lincoln, U.S. patent No. 6,301,226. Claim 1 is directed to "a method for controlling data cell transmission in a network, the method being implemented at a network element through which data cells are transferred between source and destination nodes of the network." Lincoln discloses methods implemented at source nodes and destination nodes in a network. Lincoln neither teaches nor suggests methods implemented at "a network element through which data cells are transferred between source and destination nodes of the network." Claim 1 has been amended to better emphasize this patentable distinction over Lincoln.

Lincoln fails to teach or suggest modifying a second control cell received on a second virtual channel associated with a destination node based on resource management data determined from a management event generated upon receipt of a first control cell over a first virtual channel associated with a source node. The data cell transmission control techniques described and claimed in the present application provide faster

handling of data cells (see the specification, for example, at page 9, line 23 to page 11, line 26). For all of these reasons, it is respectfully suggested that claim 1 should be allowable.

Regarding claims 2-9, these claims each depend from an allowable base claim for the reasons discussed above. As such, it is respectfully suggested that these claims should be allowable. Regarding claims 6 and 9, the Official Action alleges that both claims are anticipated by Lincoln without identifying where Lincoln discloses either "forwarding the first control cell over the second virtual channel prior to determining the first resource management data" or "computing updated resource management data using the explicit rate indication for congestion avoidance in ATM networks (ERICA) algorithm." Lincoln neither teaches nor suggests the methods of claims 6 and 9. Thus, these claims should be allowable.

Claim 10 is directed to "a data transmission apparatus for transmitting data and control cells between a source virtual channel and a destination virtual channel, the source virtual channel operatively coupling the apparatus to a source node, [and] the destination virtual operatively coupling the apparatus to a destination node." The claimed apparatus is operatively coupled to a source node and a destination node. Lincoln neither teaches nor suggests a discreet data transmission apparatus coupled to a source node and a destination node, the apparatus comprising source port circuitry, switching circuitry, management event circuitry, and return cell circuitry. For these reasons, Applicant respectfully suggests that claim 10 is patentable over Lincoln and should be allowable.

Regarding claims 11-15, these claims each depend from an allowable base claim for the reasons discussed above. As such,

it is respectfully suggested that these claims should be allowable.

Claim 16 is directed to "[a]n asynchronous data transfer mode cell control method, the method being implemented in a network switching element." Lincoln discloses methods that are implemented in source nodes and destination nodes of a network. Lincoln neither teaches nor suggests methods implemented in a "network switching element." Claim 16 has been amended to better emphasize this patentable distinction over Lincoln. For these reasons, Applicant respectfully suggests that claim 16 is patentable over Lincoln and should be allowable.

Claim 9 stands rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Lincoln in view of Jain, U.S. Patent No. 5,805,577. Claim 9 depends directly on claim 1 and incorporates all the limitations of this independent claim. The arguments presented regarding the patentability of claim 1 over Lincoln are incorporated herein. Applicant agrees that Jain teaches "computing updated resource management data using the explicit rate indication for congestion avoidance in ATM networks (ERICA) algorithm" but respectfully submits that as Lincoln neither teaches nor suggests the method of claim 1, adapting Jain's method into any method disclosed by Lincoln does not result in the method of claim 9. For these reasons, Applicant respectfully suggests that claim 9 is patentable over Lincoln in view of Jain and should be allowable.

In view of the above amendments and remarks, therefore, all of the claims should be in condition for allowance. A formal notice to that effect is respectfully solicited. Attached is a marked-up version of the changes being made by the current amendment.

Enclosed is a $110 check for the Petition for Extension of Time fee. Please apply any other charges or credits to Deposit Account No. 06-1050.

Applicant asks that all claims be allowed.

Respectfully submitted,

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William E. Hunter
Reg. No. 47,671

Fish & Richardson P.C.
5000 Bank One Center
1717 Main Street
Dallas, Texas 75201
Telephone: (214) 747-5070
Facsimile: (214) 747-2091

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Version with markings to show changes made

In the specification:

Paragraph beginning at page 1, line 22 has been amended as follows:

ATM cells are sent from originating network access equipment, typically located at a customer's premises, to an ATM network and from the ATM network to destination network access equipment, typically located at a second customer's premises. The ATM network provides end-to-end routing of the ATM cells.

Paragraph beginning at page 2, line 7 has been amended as follows:

In general, in one aspect, the invention features a method for controlling data cell transmission in a network. The control method can be implemented at a network element through which data cells are transferred between source and destination nodes. The method includes receiving a control cell on a virtual channel from a source node, generating a management event upon receipt of the control cell, and processing the management even to compute resource management data. Upon the subsequent receipt of a control cell on a virtual channel from a destination node, the control cell from the destination node is [modifying] modified using the computed resource management data and transmitted over the first virtual channel toward the source node.

Paragraph beginning at page 5, line 1 has been amended as follows:

Network access equipment 101-103 may combine data from multiple sources. For example, data from a LAN [110] 115 and

circuit oriented traffic, such as a T1 connection from a private branch exchange phone system (PBX) [115] 110, may each be converted to ATM cells at network access equipment 101 and the resulting cells multiplexed over a trunk interface 141. VPI and VCI information in transmitted ATM cells is used to uniquely identify data sources and destinations at network access equipment 101 and at switches 131-134 within the ATM network 130. For example, by assigning a unique VPI/VCI value to ATM cells transporting LAN [110] 115 data and a different VPI/VCI value to cells transporting PBX [115] 110 data, independent routing and logical separation of the PBX 110 and LAN 115 data can be maintained.

Paragraph beginning at page 7, line 12 has been amended as follows:

In general, a particular set of VPI/VCI values is meaningful at a single switch along an end-to-end path through the ATM network. Thus, for example, the VPI/VCI values assigned by the access unit 101 allow[s] routing between input and output ports of switch 131, but those values will not properly route the cell through switches 132-134 or through access unit 103. To enable routing along the entire end-to-end path, each ATM switch maintains a translation table used to track and translate (reassign) a cell 's VPI/VCI values as the cell is transported through the switch. For example, to transport an ATM cell between access unit 101 and 103 on a path through switches 131, 132, 134, 133, VPI/VCI translation information is established at each point in the path between 101 and 103. When the cell originating at access unit 101 is received at the switch 131, the VPI/VCI information in the user-network interface header allows routing to the proper output port on the switch 131 and,

prior to the cell exiting the switch 131 through that output port, the VPI/VCI information is replaced with new VPI/VCI information to allow routing through switch 132. The process of determining an output port and replacing VPI/VCI information may be repeated at each switch along the end-to-end path.

Paragraph beginning at page 7, line 26 has been amended as follows:

A class of service is associated with each ATM connection when the connection is established. In an ATM network based on ATM Forum standards, four classes of service have been defined. The first class, constant bit rate (CBR) specifies a fixed data rate connection. Switches in the ATM network 130 must reserve sufficient capacity to ensure that the specified data rate can be provided and may monitor incoming traffic to ensure that the connection from the user does not exceed the specified capacity. The second service class, variable [but] bit rate (VBR) identifies both a sustained (nominal) and burst rate. In general, a VBR service will provide data at a specified nominal rate but may increase its data rate up to a specified maximum during periods of peak traffic. A third class, unspecified bit rate (UBR), may be referred to as a best-effort service. UBR connections do not guarantee network capacity, and may result in cell discard. Finally, a fourth class, available bit rate (ABR) guarantees a minimum capacity and, when additional network capacity is available, allows [bust] bursts above the minimum rate without risk of cell loss.

Paragraph beginning at page 9, line 4 has been amended as follows:

A source node may receive rate-control feedback from a destination node or an ATM network [100] 130 (Fig. 1) element [thorough] through which a virtual channel from the source passes. A number of rate control mechanisms can be used to detect and report[ed] congestion at various points along a virtual channel. For example, a switch can set the explicit forward congestion indication (EFCI) condition in an ATM data cell header (using the payload type field) being transmitted in a forward direction. In response, the destination system may set the CI bit in a BRM cell to indicate network congestion. A switch may also directly set the CI or NI bit in a forward or backward resource management cell to indicate that there is congestion in the network. If the CI or NI bit is sent in a FRM cell, the bit will remain set in BRM cells. Additionally, a switch can modify the ER field value in a FRM or BRM cell.

Paragraph beginning at page 9, line 14 has been amended as follows:

Fig. 3 illustrates an ATM switch 300 providing resource management services. The switch 300 has three ports 310, 320, 330 connecting physical links to the switch 300. ATM cells sent to or from a port 310, 320, or 330 are processed by port circuitry and may be switched among ports by switching fabric [309] 302. Each port includes, among other things, circuitry to process FRM 301 cells arriving from source nodes and BRM 303 cells directed back to the source nodes. The processing circuitry of port 310 is shown in detail and includes circuit elements 311-315. Ports 320, 330 may include circuitry similar to the circuitry of port 310 or, in a shared implementation, ports 320 and 330 may share one or more elements of circuitry 311-315 with port 310. For example, the processor 313, queue 312

and database 314 may be shared by all of the ports 310, 320, 330.

Paragraph beginning at page 10, line 4 has been amended as follows:

As BRM cells pass through the switch 300 on a virtual channel back to a source node, the cells 303 are provided to BRM cell modification circuitry 315. The circuitry 315 can compare RM data in a BRM cell 303 with RM data in the database 314. To compare RM data in the cell 303 with RM data in the database 314, the circuitry 315 reads virtual channel (VPI/VCI) information from the cell 303 and retrieves a RM record associated with that virtual channel from the database 314. Based on the comparison between the data in the cell 303 and the data retrieved from the database 314, the circuitry 315 determines whether the RM data in the cell 303 is to be modified. In general, if the RM data in the cell 303 indicates a higher data rate than is indicated by the RM data in the database 314, the rate indicated by the cell 303 is lowered. On the other hand, if the RM data in the cell 303 indicates a lower rate than that in the database 314, the RM data in the cell 303 is not modified.

Paragraph beginning at page 10, line 15 has been amended as follows:

RM data in the database 314 is derived from the processing of data in FRM cells. As ATM cells pass[es] through the port 310, they are provided to FRM cell processing circuitry 311. The circuitry 311 can detect FRM cells on each virtual channel processed by the port 310. When a FRM cell 301 is detected by the circuitry 311, the circuitry 311 generates a FRM event 316

and places the FRM event 316 in a queue 312. The FRM event 316 includes the FRM cell 301 data elements that are used in the calculation and updating of RM data in the database 314. An FRM event 316 may include virtual channel (VPI/VCI) data alone or may include virtual channel data along with other RM data and other cell 301 header and/or payload values. After the circuitry 311 has read needed data values from the cell 301, the cell 301 may be sent to other switch components, such as the switching fabric [309] 302 for further switch 300 processing.

Paragraph beginning at page 11, line 18 has been amended as follows:

Modification circuitry 315 may be a general purpose processor or special purpose circuitry configured to modify BRM cells. In a processor-based implementation, one or more of the FRM processing, queuing, RM algorithm execution, database storage, and BRM processing functions described with respect to circuit elements 311-315 may be performed by a special or general-purpose processor rather than by a separate circuit element 311-315. In an arrival-time independent implementation, the calculation of RM data in the database 314 is performed independent of the arrival of FRM and BRM cells. For example, since FRM events are queued in queue 312, the processor 313 may complete RM algorithm calculations for a given FRM event after the FRM cell associated with that FRM event has departed the switch 300.

Paragraph beginning at page 11, line 27 has been amended as follows:

In the exemplary implementation described above, RM data generation and BRM cell alteration was described with respect to

port 310 elements. Implementations may also perform RM data generation and BRM cell alteration at other switch 300 elements. For example, FRM Event 316 may be generated in response to FRM cell switching by the switching fabric 302 and, likewise, BRM cell modification may occur during BRM cell switching by the switching fabric 302. Non-switch implementations may also be used. For example, RM data generation and BRM cell alteration may occur within an ATM add-drop multiplexer, in an ATM over SONET digital cross-connect device, or in another ATM network [100] 130 (Fig. 1) device. Implementations may also include a single port attached to a single physical link shared by both source and destination virtual channels.

In the claims:

Claims 1, 10, and 16 have been amended as follows:

1. (amended) A method for controlling data cell transmission in a network, the method being implemented at a network element through which data cells are transferred between source and destination nodes, the method comprising:

receiving, in the network element, a first control cell on a first virtual channel, the first virtual channel being associated with a source node;

generating, in the network element, a management event upon receipt of the first control cell;

processing, in the network element, the management event to determine first resource management data;

receiving, in the network element, a second control cell on a second virtual channel, the second virtual channel being associated with a destination node;

modifying, in the network element, the second control cell using the first resource management data; and

transmitting, from the network element, the modified second control cell over the first virtual channel.

10. (amended) A data transmission apparatus for transmitting data cells and control cells between a source virtual channel and a destination virtual channel, the source virtual channel operatively coupling the apparatus to a source node, the destination virtual channel operatively coupling the apparatus to a destination node, the transmission apparatus comprising:

source port circuitry operative to send and receive control cells on a source virtual channel;

destination port circuitry operative to send and receive control cells over a destination virtual channel;

switching circuitry operatively coupling the source port circuitry and the destination port circuitry, the switching circuitry comprising circuitry to exchange data cells and control cells between the source virtual channel and the destination virtual channel[s];

management event circuitry operatively coupled to the source port circuitry to receive control cells from the source virtual channel and to compute resource management data by processing the received control cells; and

return cell circuitry operatively coupled to the source and destination port circuitry and to the management event circuitry, the return cell circuitry comprising circuitry to receive control cells from the destination port circuitry, to modify control cells based on the resource management data computed by the management event circuitry, and to provide the

modified control cells to the source port circuitry for transmission over source virtual channels.

16. (amended) An asynchronous data transfer mode cell control method, the method being implemented in a network switching element, the method comprising:

establishing, from the network switching element, a plurality of source virtual channels and destination virtual channels, each source virtual channel being paired with a destination virtual channel to for m a cell transmission path operatively coupling a source node to a destination node through the switching element;

receiving, in the network switching element, a control cell on a first source virtual channel;

generating, in the network switching element, a management event upon receipt of the control cell, the management event being associated with the first virtual channels;

processing, in the network switching element, the management event to generate resource management data; and

storing the resource management data in a database, the resource management data being associated with a first transmission path, the first transmission path comprising the first source virtual channel and a paired first destination virtual channel.